



The pressure-proof linear scale GEL 176 - made of stainless steel - was conceived for the direct use in a hydraulic cylinder. It is furthermore suited for the external installation into industrial automation lines. This linear scale offers the user the following important advantages:

- a long service life due to the contactless and wearless measuring of position magnets
- direct, digital synchronous serial output (SSI) or direct analogue current or voltage output
- there is a homogeneous supply voltage of 24 V
- for lengths up to 7,600 mm
- resolution up to 5 μm (SSI) and 16 bits (analogue)

Output signals

The absolute information on the travelled path is supplied either digitally or analogue. The digital transmission is performed in Gray-Code, so that a simple cabling is ensured and the transmission security rises. Various current/voltage outputs are available as analogue output signals.

Measuring principles

The tried and tested measuring principle was further improved. It is the running time of the torsion pulse that is measured and which is proportional to the distance between an internal start signal and a stop signal. The torsion emerges from the interaction of two magnetic fields under the position magnet. The running time is the absolute measure up to the position of the magnet and is transformed into a digital or analogue output signal.

Technical Data

sensor	analogue	SSI
sensor head	aluminium die casting	
protection class	IP 65	
sensor tube with flange	stainless steel	
pressure resistance	350 bar	
protection class	IP 67	
installation thread	M18 x 1,5	
assembly fitting position	any	
connection type	plug or cable connection	
measuring length	50 ... 7600 mm in 50 mm steps	
resolution	25 µm or 16 Bit	5 µm
linear tolerance (non-corrected)	< ± 0,02 %*, min. ± 50 µm (independent of influences of temperature from outside)	< ± 0,01 %*, min. ± 40 µm (independent of influences of temperature from outside)
repeatability	< ± 0,001 %*, min. ± 2,5 µm	
hysteresis	< 4 µm	
voltage supply	24 V DC (+20 % /-15%)	
power consumption	100 mA typ.	70 mA typ.
temperature coefficient	< 40 ppm/°C	< 15 ppm/°C
voltage sustaining capability	500 V	
operating temperature	-40 °C ... +75 °C	
EMC (if the assembly instructions are observed)		
electromagnetic emissions	EN 50081-1	
electromagnetic immunity	EN 50082-2	
The linear scale GEL 176 is in strict conformity with Directive EMC 89/336/EEC of the European Union which is certified by the CE mark.		
shock protection	100 g (single shock) as per IEC 68-2-27	
vibration protection	5 g /10 ... 150 Hz as per IEC 68-2-6	
SSI		
data format	-	Gray
data length	-	25 bits
output signal		
voltage	0 ... + 10 V or + 10 ... 0 V, $R_L \geq 5 \text{ k}\Omega$	-
current	0 ... +20 mA or +20 ... 0 mA 4 ... +20 mA or +20 ... 4 mA burden 0 ... 500 Ω	-

* referring to the measuring length

Synchronous serial interface, Pin layouts

Synchronous serial interface

Principles of serial data transmission
Gray code (25 bits)

$f \geq 100 \text{ kHz}$
 $ci = \text{clock pulse space min. } 16 \mu\text{s}$
 $T = \text{cycle duration of the clock signal}$

Number of distance measurements per second

measuring length	150	300	500	750	1000	2000
measurements	10000	6600	4500	3300	2500	1400

Baud rate

The transmission rate depends on the line length and reaches a maximum of 1.5 Mbaud. Use screened cables with paired wires.

cable length	<50	<100	<200	<400
clock frequency [kHz]	<400	<300	<200	<100

Pin layout (analogue)

6-pole plug or cable outlet

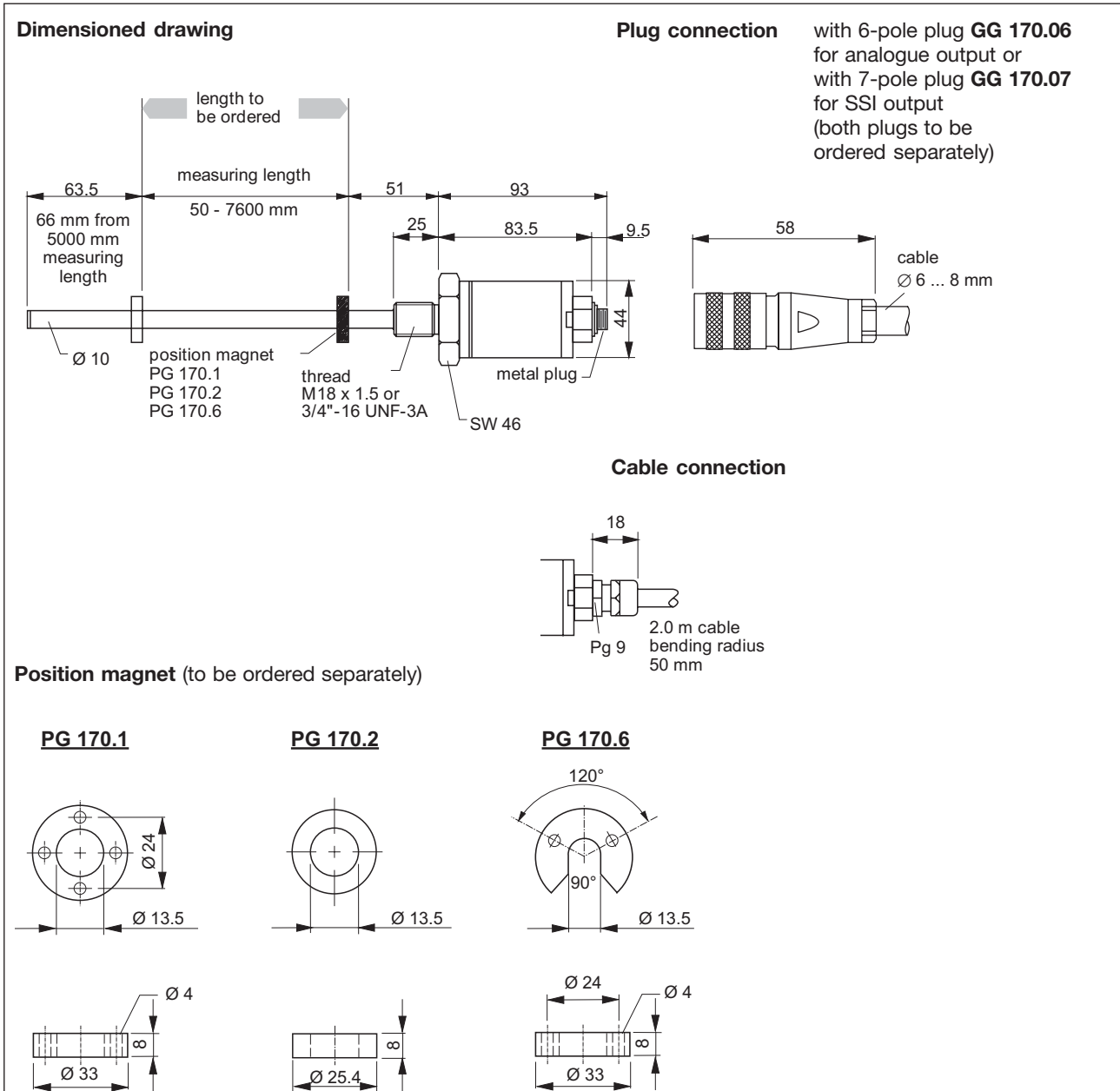
<p>soldered side</p>	pin	cable	0 ... 20 mA	20 ... 0 mA	4 ... 20 mA	20 ... 4 mA	0 ... 10 V	10 ... 0 V
	1	grey	0 ... 20 mA	20 ... 0 mA	4 ... 20 mA	20 ... 0 mA	0 ... 10 V	10 ... 0 V
	2	pink	DC GND					
	3	yellow	nc	nc	nc	nc	nc	nc
	4	green	nc					
	5	brown	+ 24 V DC (+ 20 % / -15 %)					
	6	white	DC GND					

Pin layout (SSI)

7-pole plug or cable outlet

<p>soldered side</p>	pin	cable	signal
	1	grey	data (-)
	2	pink	data (+)
	3	yellow	clock (+)
	4	green	clock (-)
	5	brown	+24 V DC
	6	white	0 V
7	-	nc	

Dimensioned drawings, Type code



Type code

176	X	XXXX	X	Description
			A	connection plug output
			F	cable output without plug, 2 m
		0050		measuring length e.g. 50 mm, please state in 50-mm steps
			A	current 0 ... 10 V
			Z	10 ... 0 V
			B	0 ... 20 mA
			C	4 ... 20 mA
			D	20 ... 0 mA
			E	20 ... 4 mA
			S	SSI output (Gray-Code, 25 bits)

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